



Insights into the Adsorption of Arsenates on γ - AlOOH : A Flow-Adsorption Microcalorimetry Study

Allen N¹, Tran C¹, Gale A², Kabengi N³

[1] Undergraduate Research, College of Arts and Sciences, Georgia State University, Atlanta, Georgia,

[2] Post-doc, Department of Geosciences, College of Arts and Sciences, Georgia State University, Atlanta, Georgia

[3] Professor, Department of Geosciences, College of Arts and Sciences, Georgia State University, Atlanta, Georgia

Abstract:

Arsenate poisoning is a serious problem in soil regions with naturally high arsenic concentration. The arsenates from natural sources leach into groundwater, causing cases of arsenic poisoning worldwide. This study focuses on investigating the binding interactions between various arsenate ions and a commonly occurring aluminum oxyhydroxide, boehmite (γ - AlOOH).

In addition to inorganic arsenates at different protonation states, experiments will also employ two of the most prevalent methylated arsenate species: monomethylated arsenate (MMA) and dimethylated arsenate (DMA).

Analysis will be carried out using flow adsorption microcalorimetry (FAMC). By observing trends in the molar heats of adsorption in repeated adsorption and desorption cycles, experimental data will be used to discern aspects of both inner- and outer-sphere reactions, as well as the ratio of monodentate versus bidentate complexation of arsenate to boehmite.

The enthalpy data from FAMC will be used to elucidate transition states and reaction kinetics.

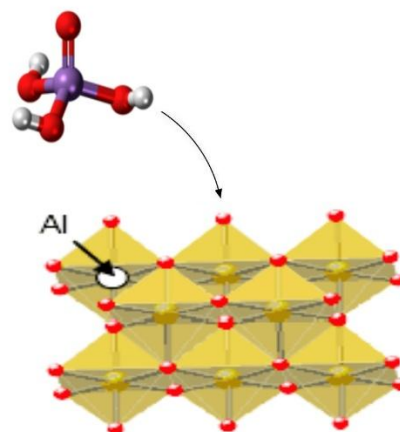


FIGURE 1: Structure of arsenate and boehmite.

The combined data and calculations can then be used to improve computer modeling and understanding of ionic interactions with aluminum oxyhydroxide crystal structures, as well as verify current geochemical models and theories.